



CARING
FOR
OUR
COUNTRY

Land management practice
trends in Australia's
broadacre cropping industries



Introduction

Broadacre cropping (which includes cereals, oilseeds, lupins, sugar cane, legumes, hops, cotton, hay and silage) is an important Australian industry, contributing over \$20 billion, or more than 50 per cent, of the gross value of agricultural production in 2009–10 (ABS 2011). According to national land use mapping, about 26.5 million hectares, or 3 per cent of the total area of Australia (Figure 1), was cropped in 2005–06 (ABARE–BRS 2010). This mapping shows an increase in cropping of more than 38 per cent between 1992–93 and 2005–06 (ABARES 2011).

Improving soil condition is important to agricultural productivity and the quality of ecosystem services provided to the community from rural lands. Wind and water erosion, soil carbon rundown and soil acidification processes reduce the land's ability to provide clean air and water and productive soils, protect biodiversity and maintain the resilience of the landscape to climate change, whilst producing food and fibre. Table 1 summarises the impact of some land management practices used in the broadacre cropping industry on soil condition.

Caring for our Country—the Australian Government's \$2 billion flagship natural resource management initiative—is funding projects in the sustainable farm practices national priority area under the improving management practices and landscape scale conservation targets. These projects provide information to farmers in the broadacre cropping, dairy, horticulture and beef/sheep industries about land management practices that will help improve soil condition and contribute to maintaining a healthy environment.

By 1 November 2011, \$442 million had been approved for projects to improve soil and biodiversity management practices on farm. On farm practice change is being monitored using the biennial Australian Bureau of Statistics' (ABS) Agricultural Resource Management Survey (ARMS), which surveys 33 000 of Australia's 135 000 agricultural businesses (farmers). Results are reported at the national, state and natural resource management (NRM) region levels (ABS 2009).

Figure 1

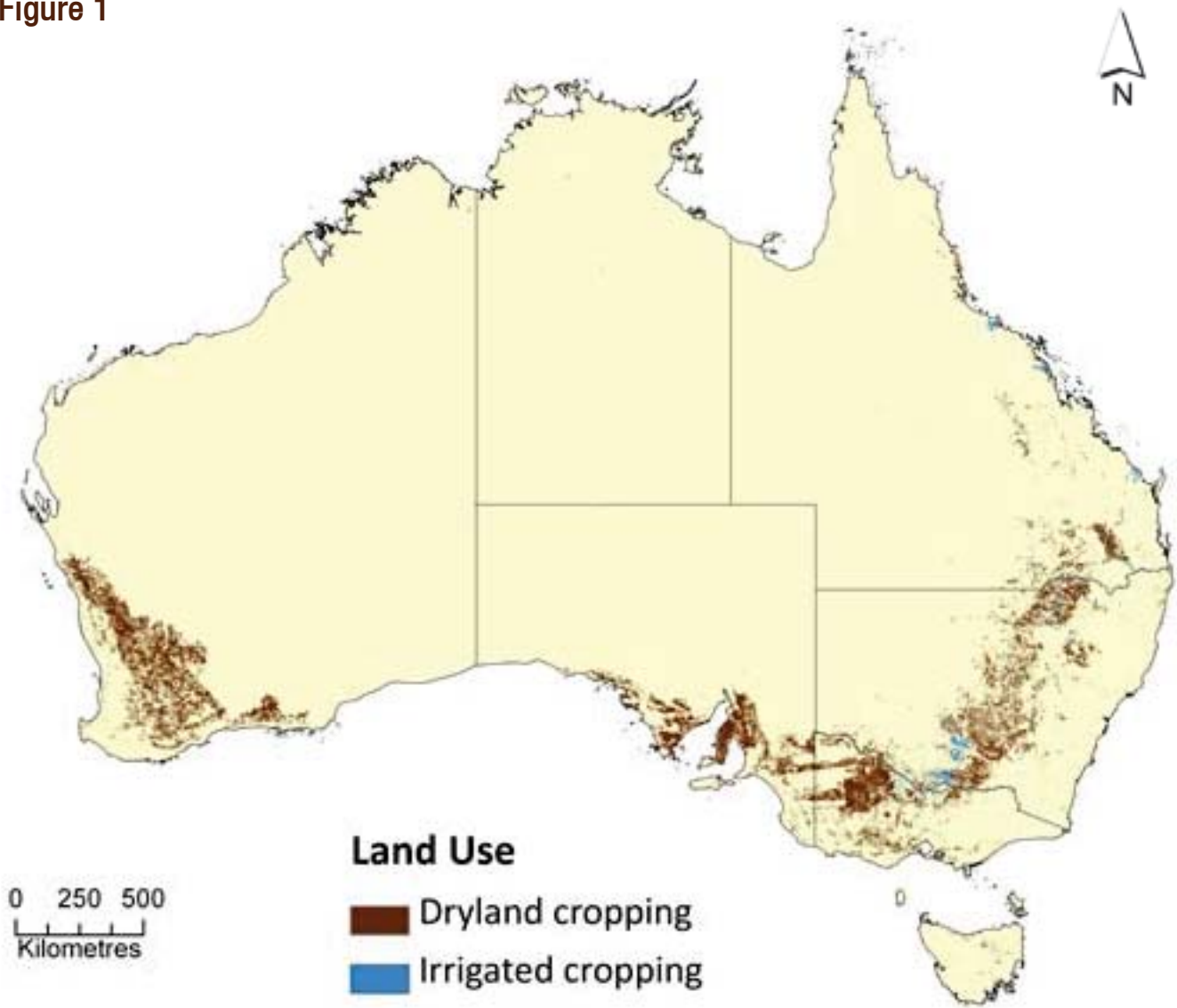


Figure 1. The location of cropping in Australia in 2005–06. Source: ABARE–BRS (2010).

Table 1

Practice	Increases carbon	Reduces wind erosion risk	Reduces water erosion risk	Reduces soil acidification risk
No cultivation apart from sowing	Indirectly	Y	Y	
Crop residue left intact	Y	Y	Y	
Soil pH testing	Indirectly	Indirectly	Indirectly	Y
Soil nutrient testing				Y
Lime or dolomite applied to reduce soil acidity	Indirectly	Indirectly	Indirectly	Y

Table 1. Some cropping management practices expected to improve soil condition.

Cropping industry profile

According to ABS estimates, in 2009–10 there were 64 600 broadacre cropping businesses (farmers) in Australia, a decrease of nearly 8 per cent since 2007–08. During this time the area of broadacre crops also decreased slightly (by less than 1 per cent). In 2009–10 the

average age of managers of crop businesses was 55, on average they had managed their holdings for 25 years and farmed in their local region for 32 years. An estimated 24 per cent of crop businesses (15 000) had a Landcare group member.

Land management practices

Project funding provided by Caring for our Country to encourage farmers to better manage ground cover by reducing tillage and increasing crop residue retention, to test and lime soils regularly and to build soil carbon, has complemented the activities of state agencies, industry and community groups. Data from the ABS 1995–96 and 2000–01 agricultural

censuses (which surveyed all agricultural businesses) and the 2007–08 and 2009–10 ARMS, help track trends in the adoption of these practices. Note that the percentage of farmers reporting the use of particular practices can exceed 100 where more than one method (e.g. crop residue retained in some areas, burnt in others) is used on a holding.

Tillage practices

Farmers have been encouraged to move to one-pass sowing systems to reduce the risk of soil loss through wind and water erosion, lower greenhouse gas emissions and to improve water use efficiency. Figure 2 shows that nationally there has been a 10 per cent increase (from 46 per cent to 56 per cent) in the number of broadacre crop businesses (farmers) using no cultivation apart from sowing when preparing cropping land between 2007–08 and 2009–10. This number has increased in every state and territory except the Northern Territory, where the numbers of broadacre cropping farmers fluctuate markedly between sampling periods. Western Australia has the largest percentage of broadacre

cropping farmers using no cultivation apart from sowing, with adoption rates at 78 per cent in 2009–10. Longer term ABS data (not shown) indicate that the current number of broadacre cropping businesses using no cultivation when preparing cropping lands is more than four times greater than in 1995–96.

There has also been a 10 per cent increase in the area prepared for crops and pastures without cultivation apart from sowing between 2007–08 and 2009–10 (from 66 to 76 per cent; Figure 3). This area has increased by 55 per cent since 1995–96 (Figure 3).

Figure 2

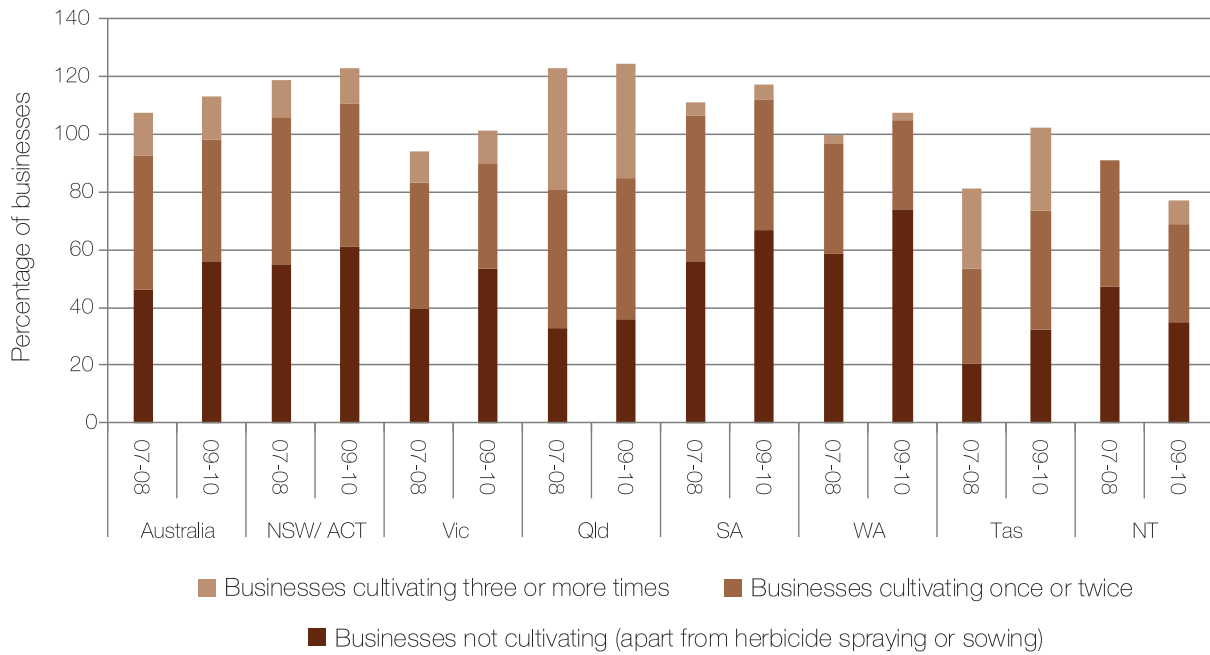


Figure 2. Percentage of businesses using different cultivation intensities to prepare land for broadacre crops between 2007–08 and 2009–10. The 2007–08 numbers include businesses preparing land for pasture.

Figure 3

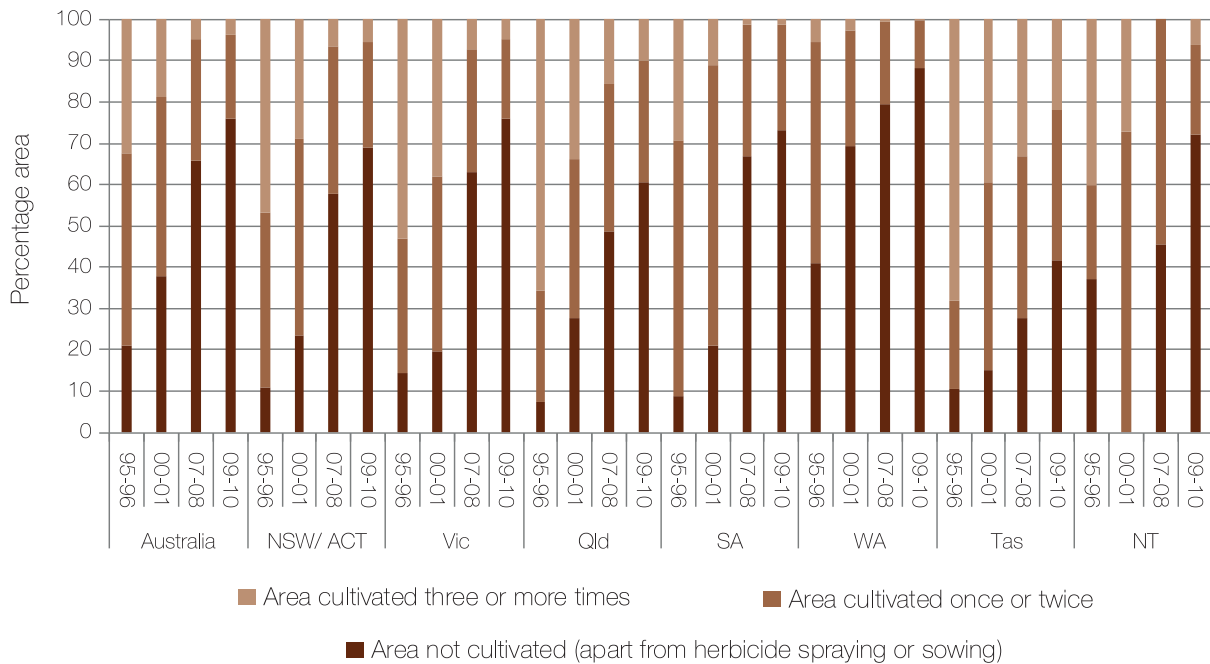


Figure 3. The percentage area of crop and/or pasture prepared using different cultivation intensities 1995–96, 2000–01, 2007–08 and 2009–10.

Crop residue management

Retaining residues between crops affords protection from soil loss through wind and water erosion, whilst helping to improve soil organic matter (soil carbon). While seasonal factors, such as the incidence of pests, weeds and disease, and heavy stubbles (in wetter years) may affect management, the trend since 1995–96 has been for increases in the numbers of farmers and the area over which crop residue is retained.

Between 2007–08 and 2009–10 there was a small increase (from 34 to 37 per cent) in the number of farmers retaining crop residues (Figure 4). These increased everywhere except

in the Northern Territory. Longer term ABS data indicate that the current number of broadacre cropping businesses retaining crop residue after harvest is more than three times greater than in 1995–96.

Over the period 2007–08 and 2009–10, the area where crop residue was retained after harvest increased from 58 per cent to 68 per cent (Figure 5). Nationally since 1995–96 the area of crop residue retention has increased by 47 per cent. This has increased in every state or territory since 1995–96 except in the Northern Territory.

Figure 4

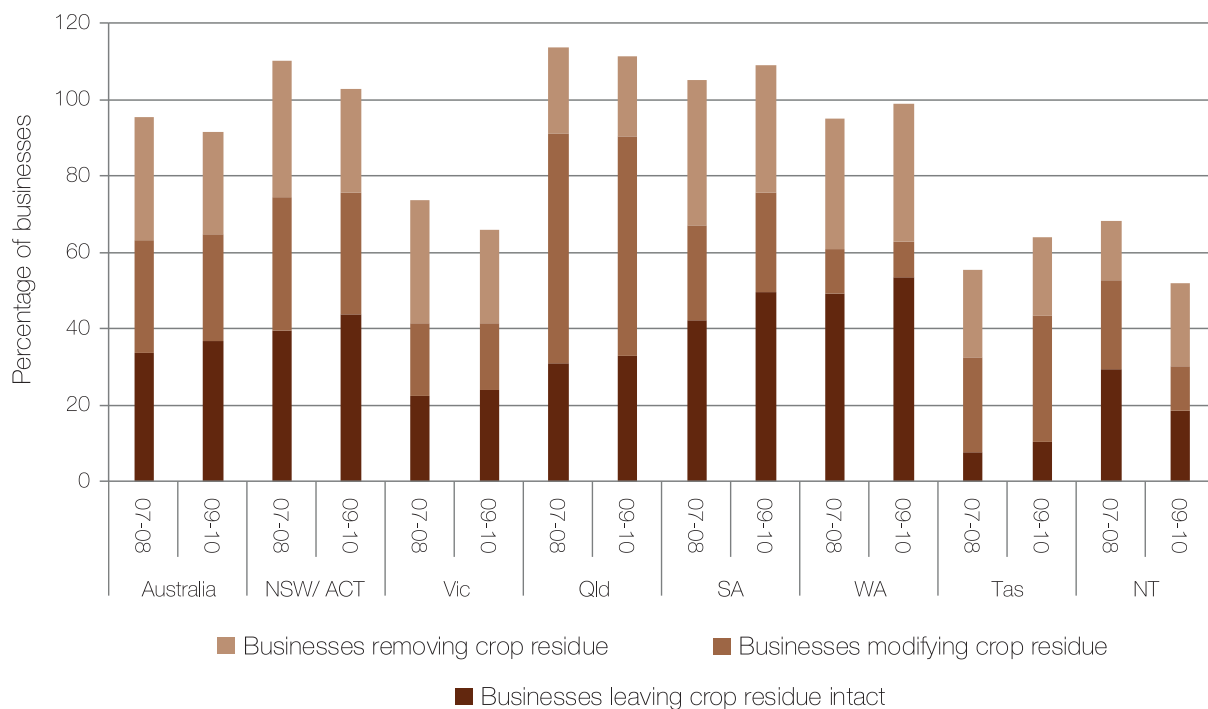


Figure 4. Percentage of broadacre cropping businesses using different crop residue management practices between 2007–08 and 2009–10



Figure 5

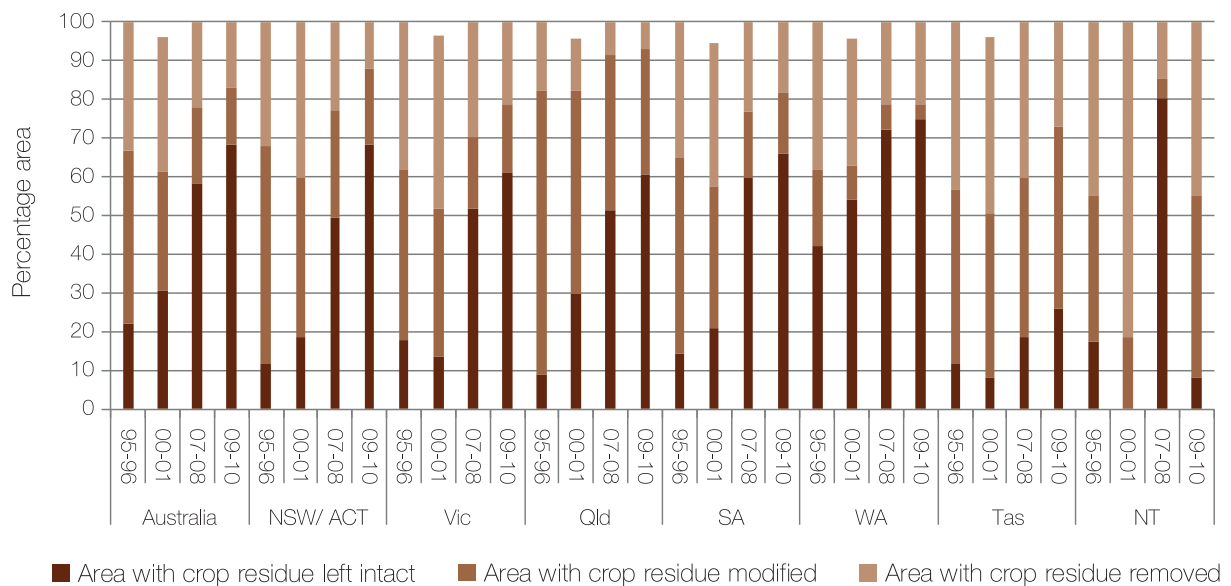


Figure 5. Percentage of crop area reported by broadacre cropping businesses with different crop residue management practices between 1995–96 and 2009–10. The 1995–96 numbers include the area where pasture stubble was managed.

Managing soil acidity

It is estimated that about 50 per cent of agricultural land has a surface soil pH less than or equal to 5.5, which is below optimum for extremely acid-sensitive agricultural crops, and below the optimal level to prevent subsoil acidification (National Land and Water Resources Audit 2001). Where soil acidity moves further down the soil profile, damage may be irreparable. Very acid soils are unlikely to support good ground cover, increasing the risk of soil loss through wind and/or water erosion and reducing input to soil carbon. About 36 per cent of Australia’s cropping land has been identified as having a high risk of soil acidification, 17 per cent at moderate risk and 47 per cent at low risk (Figure 6; Table 2). Areas

at high risk are where the soil pH is currently low, the soil has a low capacity to buffer against pH decreases, and the dominant (current and/or past) agricultural practices are highly acidifying.

Regular testing of soil pH and applications of lime and/or dolomite can be used to manage surface soil pH. Testing soil nutrient levels to better match fertiliser applications to crop requirements can also help slow soil acidification. The number of broadacre cropping businesses undertaking pH and nutrient testing declined slightly, from 29 to 27 per cent between 2007–08 and 2009–10, although there was a nine per cent increase in soil testing for both pH and nutrients in Queensland over this time (Figure 7).

Table 2

	Low risk	Moderate risk	High risk
WA	8%	8%	84%
ACT	57%	0%	43%
TAS	57%	22%	21%
NSW	62%	21%	17%
QLD	60%	23%	17%
VIC	69%	19%	12%
SA	68%	25%	7%
NT	53%	46%	1%
Total	47%	17%	36%

Table 2. Estimated percentage of cropping area at risk of soil acidification. Source: see Figure 6.

Figure 6

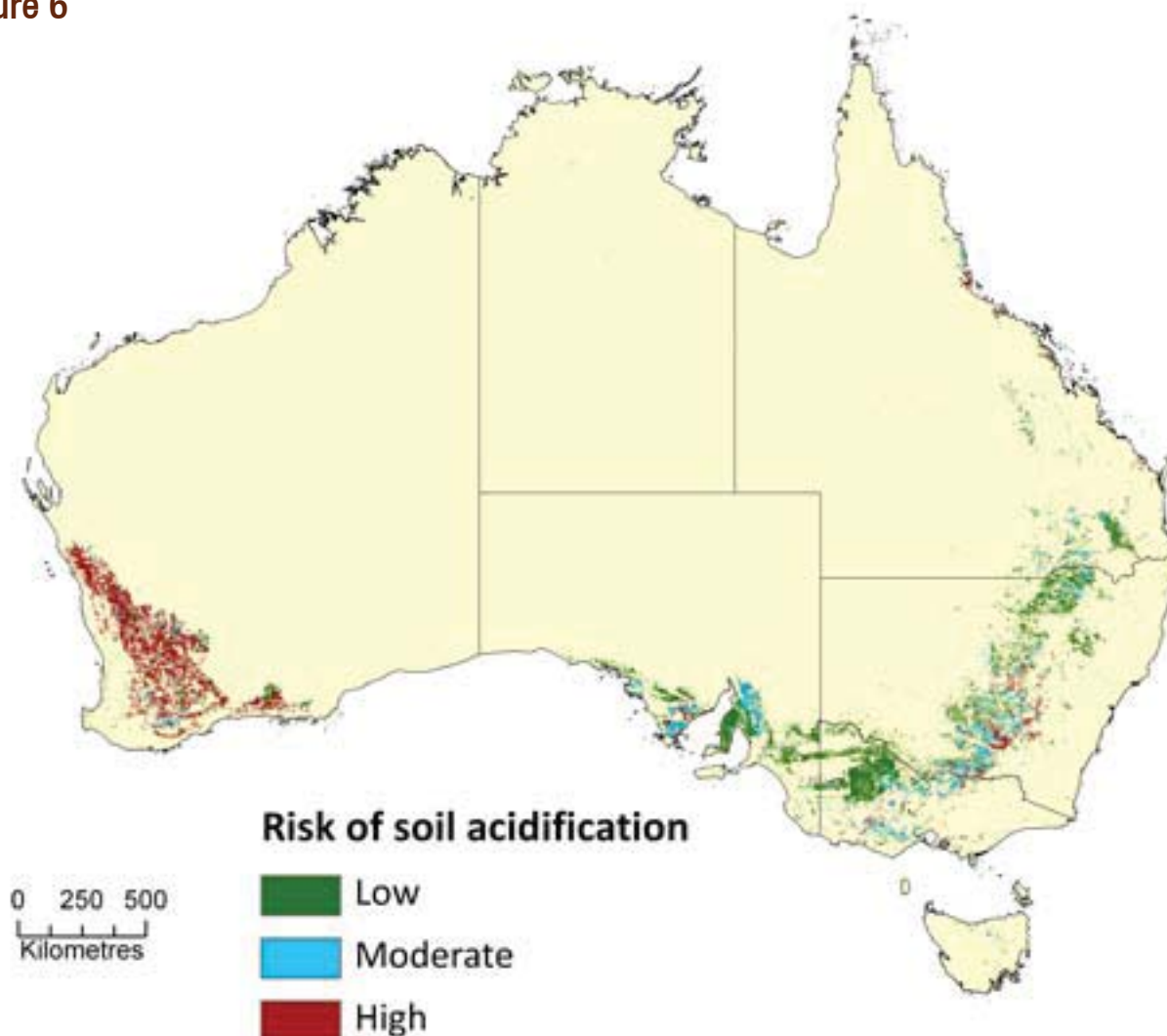


Figure 6. Cropping areas with low, moderate and high risks of soil acidification. This map and the estimates for Table 2 were produced by intersecting cropping (dryland and irrigated) from the Land use of Australia 2005–06 (ABARE–BRS 2010) with the soil acidification risk map (Wilson et al. 2009) and masking to NRM regions outside the rangelands.



Figure 7

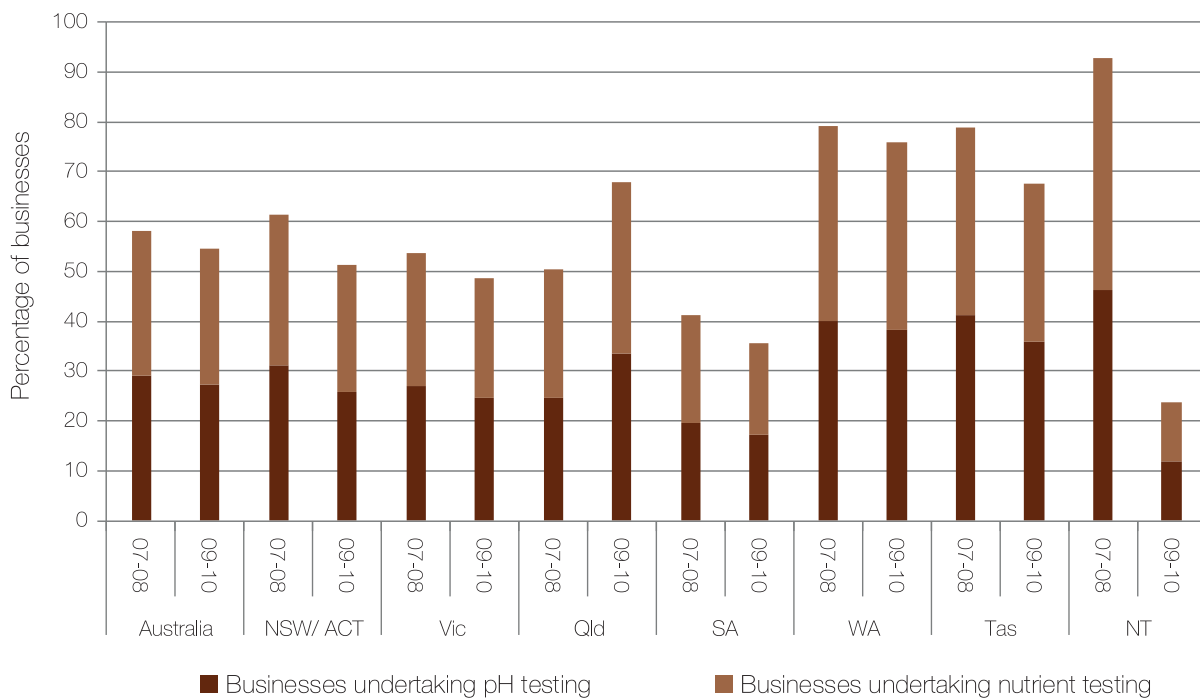


Figure 7. Percentage of broadacre cropping businesses undertaking pH and soil nutrient testing in 2007–08 and 2009–10.

There was a small increase (from 20 to 23 per cent) in the number of cropping businesses applying lime and dolomite to their holdings to manage soil acidity (Figure 8) between 2007–08 and 2009–10. Longer term data for cereal businesses (a major component

of the cropping business category which excludes cotton, rice, sugar, oilseeds and pulses), show that an estimated 8 per cent applied lime or dolomite in 1995–95; this had doubled by 2000–01 (Figure 9).

Figure 8

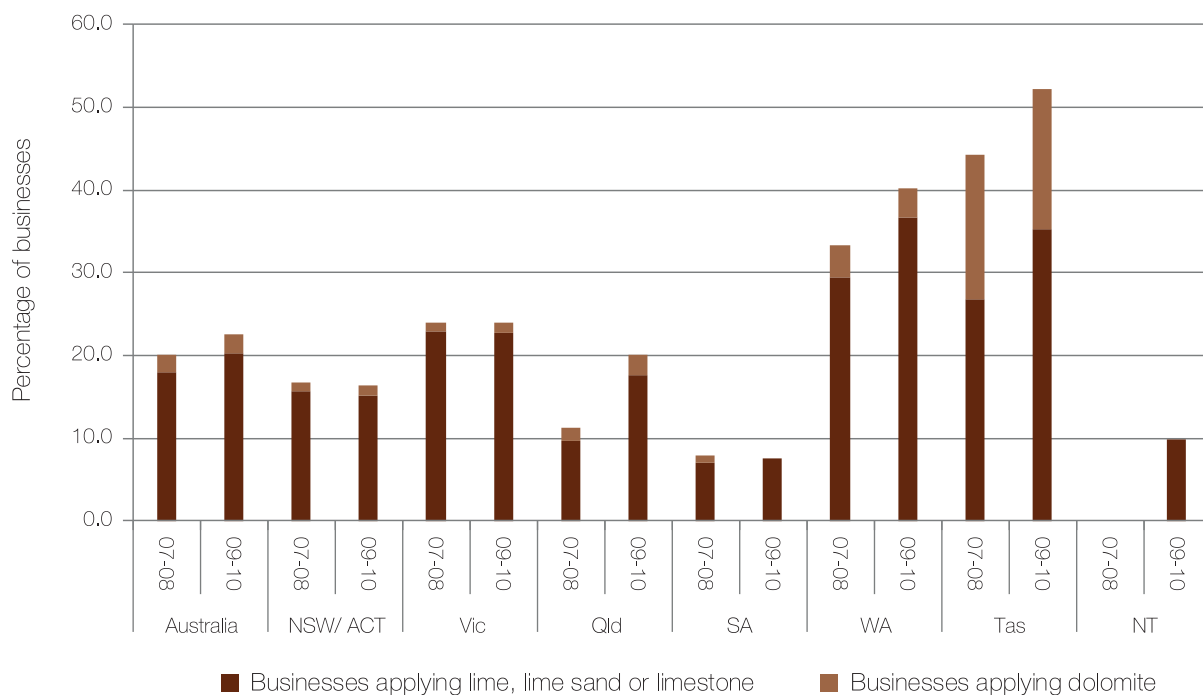


Figure 8. Percentage of broadacre cropping businesses applying lime and dolomite to their holdings in 2007–08 and 2009–10 (2007–08 data for the Northern Territory were not publishable).

Figure 9

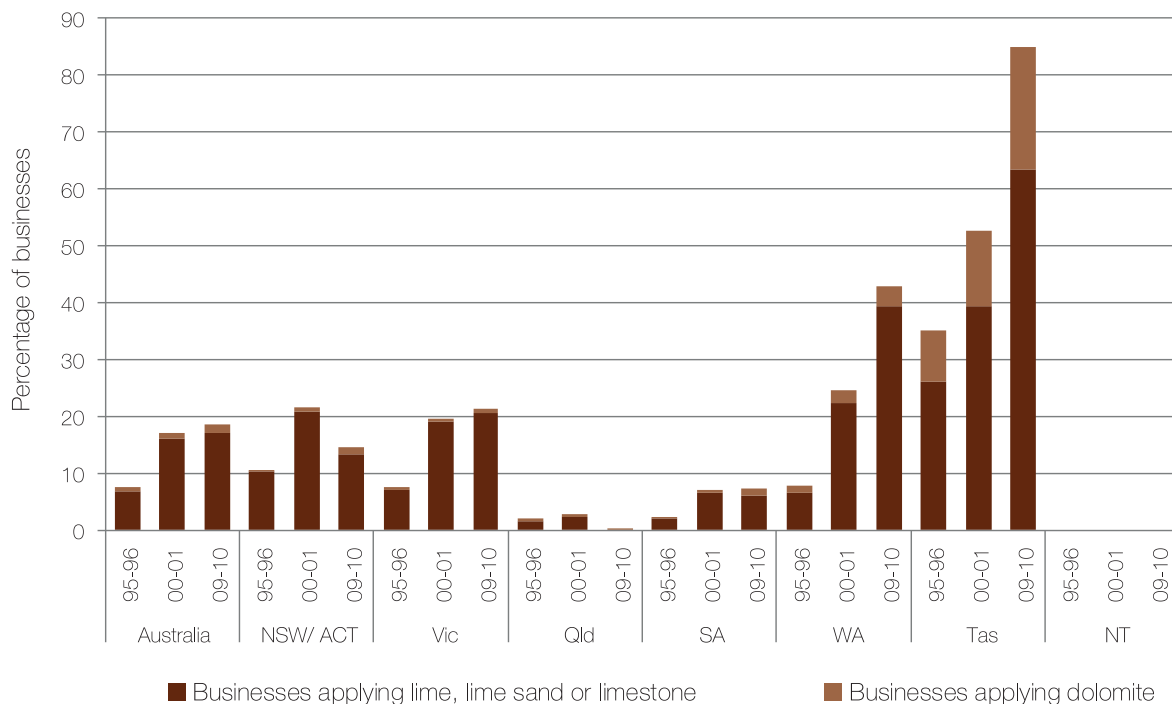


Figure 9. Percentage of cereal (excluding rice) businesses applying lime and/or dolomite to their holdings in 1995–96, 2000–2001 and 2009–10. (Note: the percentages adding lime or dolomite were zero for the Northern Territory in 1995–96 and 2000–01 and zero for dolomite in 2009–10. Lime figures were not publishable for Queensland or the Northern Territory in 2009–10).

Conclusions

These data suggest that good progress is being made in reducing tillage and increasing crop residue retention, which could be expected to reduce the risk of soil loss through wind and water erosion and increase soil carbon. Cropping industry surveys of tillage practices (Kearns and Umbers 2010, Llewellyn and D'Emden 2010) identify similar trends in the uptake of tillage and crop residue management practices. Given the extensive and insidious nature of soil acidification,

with over half of all cropland in Australia at moderate to high risk of acidification, there may be a need to increase regular testing and liming of cropping soils in some regions.

Information about regional level adoption of land management practices for 2007–08 is available at <http://tinyurl.com/89sggbk> Regional results from the 2009–10 ARMS will be available in 2012.

References

Australian Bureau of Agricultural and Resource Economics and Sciences (2011), *Guidelines for land use mapping in Australia: principles, procedures and definitions*, 4th edition, Department of Agriculture, Fisheries and Forestry, Canberra.

Australian Bureau of Agricultural and Resource Economics–Bureau of Rural Sciences (2010), *Land use of Australia 2005–06*, Version 4, Department of Agriculture, Fisheries and Forestry, Canberra.

Australian Bureau of Statistics (2009), 4627.0, *Land Management and Farming in Australia, 2007–08*. <http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/C3FC0BDD85E571DBCA2578B50011D983?opendocument>.

Australian Bureau of Statistics (2011), 7503.0, *Value of Agricultural Commodities Produced, Australia, 2009–10*.

Kearns S and Umbers A. (2010) *2010 GRDC Farm Practices Baseline Report*. Report for Grains Research and Development Corporation.

Llewellyn RS, D'Emden, F. (2010) *Adoption of no-till cropping practices in Australian grain growing regions*. CSIRO report for GRDC, SA No-till Farmers Association and CAAANZ.

National Land and Water Resources Audit (2001), *Australian Agriculture Assessment 2001*, Volume2, Commonwealth of Australia.

Wilson, P., Baldock, J., Grundy, M., Jacquier, J., Griffin, T., Moody, P., Chapman, G., Hall, J., Maschmedt, D., Crawford, D., Hill, J., and D. Kidd (2009), *Identification of land with a risk of acidification*, CSIRO Sustainable Agriculture Flagship, report prepared for Caring for our Country.



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